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ABSTRACT

This report describes development of the "Prepare Them for the Future" project, a K-3 activity-oriented science curriculum. The program, funded through two grants, was driven by the need to boost the distressed labor-based economy in rural western Pennsylvania. Data showed a drop of 1,100 coal-mining jobs between 1980 and 1986 in Indiana County, location of the "Prepare" pilot program. The program was developed with help from local university personnel and through input from classroom teachers. It was designed to use the most current methods of science education with the expressed objective of influencing teacher and student attitudes toward science. Teachers played a significant role in creating the curriculum. Another goal of the program was to collect data about the impact of the curriculum change. The research focused on the attitudes held by primary elementary teachers and students regarding science education. Teachers and K-3 students at the pilot school completed a science-attitude instrument before and after the curriculum project began. Significant increases were measured only in the scores of the kindergartners surveyed. Leadership, faculty involvement, and the availability of faculty work time were seen as being important factors in the success of the program. The report recommends further staff development, follow-up inservice training, administrative cooperation, and more follow-up research. (TES)

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The Pennsylvania Academy for the Profession of Teaching; Rural Fellowship Program: A Science Curriculum Development Partnership

Project Prepare Them for the Future

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Abstract

The Pennsylvania legislature has allocated monies for the past several years to fund rural initiatives. "The Center for Rural Pennsylvania" is exclusively devoted to enhancing the economic vitality of the state. Their activity has included the funding of educational projects.

"The Pennsylvania Academy for the Profession of Teaching" piloted a rural fellowship program in 1989. The purpose of the program was to develop partnerships between Pennsylvania's state universities and public schools. Project Prepare Them for the Future was funded through grants from the Center for Rural Pennsylvania and The Pennsylvania Academy for the Profession of Teaching.

Project Prepare Them for the Future is a grades K-3 activity oriented science curriculum. The project is aimed at preparing young children for a technology driven future.

The major incentive for the project is economic in nature. The labor based economy of rural western Pennsylvania has declined in the last decade as a viable employment option for young people. Because early learned behaviors and attitudes tend to persist, our goal is to point the way for young children toward learnings which are expected to help them to succeed and be able to contribute in tomorrow's world.

Objectives

The objectives for project Prepare Them for the Future, as stated in the project proposal were:

1. To develop a complete science curriculum for grades K - 3. This curriculum to be cooperatively developed with the faculty that will use it. The curriculum is to be developed in full consideration of the most current methods and knowledge of science education.

2. To positively influence teacher and student attitudes toward science as measured by an attitude assessment to be conducted at the outset and the conclusion of the project.

Science Partnership Summary

In 1986 the Penns Manor Elementary School completed a self study. One of the recommendations of that study was that the teaching of primary science be increased. In April 1987 the Commonwealth of Pennsylvania, Labor Market Analysis Unit released employment data for Indiana County Pennsylvania. Those data indicated a drop of 1100 jobs in coal mining in the county between the years 1980 and 1986. Penns Manors' self-study reported that 29% of parents with children attending the Penns Manor schools were employed in mining.

The Center for Rural Pennsylvania offered support for our efforts to boost the economic vitality of rural Pennsylvania. Our project is

based on the assumption that by providing young children with investigation-oriented science experiences, we will ultimately assist them in developing as problem solvers, capable of coping with the challenges of the future.

Recent studies by the American Association for the Advancement of Science and the Carnegie Foundation support the need for, and value of a science curriculum based on activity rather than memorization of facts or procedures.

An important contributor to the success of this project has been the Pennsylvania Academy for the Profession of Teaching's Rural Fellows program. In January 1989 Mrs. Marianne Spicher, a Penns Manor faculty member entered into the rural fellows exchange program. Through that program Mrs. Spicher came to the IUP University School for the Spring semester. Her major activity was to work with Dr. Beisel on the development of the curriculum.

The total dollar amount in support of this project contributed both by The Center for Rural Pennsylvania and the Pennsylvania Academy for the Profession of Teaching was $26,200. The two major products are as follows:

1. A complete K-3 science curriculum in excess of 400 pages in length. The curriculum has been synthesized from a wide variety of sources to gather the best, activity oriented content available nationwide around four curriculum strands.

2. Baseline research data on the impact of our curriculum change methodology is being conducted. The research is focused on:

   a.) the attitudes toward teaching science of primary elementary teachers.
   b.) the attitudes toward science of primary elementary children.

These data serve as the basis for analysis of the project in terms of it's worth for replication elsewhere. The physical curriculum is also a product which has the potential for sharing with other elementary schools. Although our creative work is complete, the pilot testing of the curriculum has not been sufficiently done, therefore, dissemination at this time is not appropriate. Extensive pilot testing will take place during the 1989-90 school year. We will make adaptations based on teacher input. It is expected that at the conclusion of the 1989-90 school year the curriculum will be ready for distribution to those schools interested in curriculum assistance in primary elementary science.

Results of Research

In May 1988, prior to the beginning of the project, the primary teachers at Penns Manor School completed the Shrigley-Johnson Science Attitude

Scale for Elementary Teachers. This instrument was administered by the elementary principal. Teacher responses were anonymous. The mean score of the group of thirteen teachers on the 25 item scale was 85.4. This result when compared to the range of scores possible, 25 being a totally negative attitude toward science, and 125 being the most positive result possible, indicates a slightly better than neutral attitude toward science in the group (75 is neutral).

In May 1989 the instrument was readministered. Twelve pre-post sets of data were analyzed. The mean score of the primary teachers on the posttest was 91.8 representing a 6.4 point increase. A T-test was run on the rav data. The T value was 1.91, with a probability of error of .082. This does not indicate a statistically significant difference between the pretest and the posttest.

In October 1988, 367 students in grades K - 3 were given an attitude toward science scale newly developed by Dr. Beisel and Mr. David Cowles of the Penns Manor faculty. In May 1989 the instrument was readministered. There were 323 sets of pre-post data subjected to the T-test. No significant differences were found when the four grades were analyzed together. There was, however, a significant increase in the scores of 74 kindergarteners, T = -2.31, probability of error .024.

Curriculum Design Strategies

The following strategies were used to involve the primary grades faculty in the decisions of curriculum content, and to help them feel involved in the creation of their own curriculum.

1. Prior to a group meeting the teachers were asked to prepare to contribute the science topics that they already teach or that they feel should be taught.

2. At a meeting of the involved faculty the science content areas were presented and a group consensus was reached on four content strands they would most like to develop across the primary grades. These areas were determined to be plants, animals, physical science (matter, magnetism, sound, light and color, and simple machines), and weather.

3. Two teacher representatives from the primary faculty volunteered to assume the major responsibility for working on the curriculum development. These teachers received release time and attended a state and regional science conference with university partners to gather materials and ideas.

4. Following the compilation of curriculum content the draft materials were submitted to the teachers for their input.

5. Edits were done in response to teacher input.

Completed content strands were presented to the teachers with all materials necessary in grade level, hands-on inservice.

Pedagogy Advocated

Rather than the common technique of avoiding content taught in previous years our curriculum is designed to review and elaborate on prior knowledge and experience. Consistent with learning theory, this method reinforces and develops students' understanding of each curriculum area.

Key vocabulary for each section of the curriculum is reviewed and built upon across the grades.

The point of view of Karplus is advocated as a guiding principle for teachers. From the Elementary Science Study Newsletter, October, 1965 -

"Many teachers are reluctant to let pupils draw their own learnings from an experience. Instead, they feel they should summarize at the end of a period what has happened and what they intended the children to learn. This unfortunate tendency is so common among teachers that it has been given a name, lysiphobia - - the fear of leaving "loose ends." Besides forcing on the children conclusions they are not capable of assimilating, this tying-up of things in a neat package cuts off the gradual growth in understanding which comes when the children try out their glimmerings of new ideas or other experiences at school and at home. In fact, it is probably worthwhile to do the contrary, to stir up any conclusions the children have reached by reminding them of the incompleteness of their understandings -- of unanswered questions or of ambiguous interpretations."

Components of the Project of Importance in Ensuring Implementation in the Rural, Penns Manor Elementary School

It is felt that Penns Manor Elementary is fairly representative of many rural schools in Pennsylvania. A cross section of teachers including, primarily veterans, have an average tenure in the profession of approximately 15 years. There are a number of individuals on the faculty who put a minimal amount of effort into their jobs. There are a number of highly motivated individuals who are active learners and producers. The majority have adopted a routine for teaching, are diligent in their work, and accept the change process to the degree required to keep their curriculum up to date with national trends.

Identified below are three major factors felt to be instrumental in the degree of success achieved to date, and more importantly, to long term curriculum implementation.

The Factor of Leadership

The factor of leadership, encompassing openness to opportunity and progress, awareness and advocacy of effective pedagogical practices, modeling of a work ethic, and empowering teachers in matters of curriculum, leadership, and professional growth is an advantage to the Penns Manor school. In other words, the leadership enables, encourages, and expects a quality school. The faculty respond by going a bit beyond the mean as compared to the efforts of teachers and perhaps, the quality of other rural schools. Mr. Edward Meshanko is the elementary principal at Penns Manor. Mr. Meshanko is hereby acknovledged for his important leadership role in the project.

Some examples of behaviors of the elementary principal which contribute to the effectiveness of his leadership are:

1. Setting a positive social-emotional climate in the school.

2. Advocacy of goals and projects related to the quality of education at meetings of the school board, district administration, and faculty.

3. Setting reasonable goals for improvement with the faculty on an annual basis.

4. Facilitating the efforts of faculty to attend professional meetings.

5. Willingness to accept undergraduate teacher educators for practicum experiences. This enriches and envigorates the faculty mentors as well as gives them an extra incentive to model good teaching.

6. Willingness to invite university faculty to participate in activities of the school, as well as curriculum development activities.

The Factor of Ownership

A second major factor of importance to the long term success of the project is <u>the direct involvement of school faculty members</u> in the evolution of the curriculum. Initially, two primary faculty members, Mrs. Pamela DiCello, and Mrs. Marianne Spicher volunteered to work with the project over the 1988-89 school year. These teachers were released from normal teaching duties to attend two conferences, and to come to IUP on several occasions to work on the initial gathering of curriculum materials and resources.

Following our early work in the Fall of 1988, we presented initial outlines to the faculty for input. Their input was an important part of the evolution of the work. The fact was that only a few teachers provided specific feedback, but the most important point was that the teachers knew that we were interested in, and responsive to their input. This is felt to be an important factor influencing their attitudes toward a major change process.

The Factor of Quality Time

Excellent work is not done in the evening, following a work day, or on Saturdays at the expense of personal needs and family life. Both of our funding sources have allowed us to cover our responsibilities with substitute teachers thereby enabling normal work days to be used. In addition to gaining quality time, our expenses for attending conferences were paid. Our initial looks at "state of the art" practices were made at the state and national science conferences. Due to the fact that this business related activity was paid for, again, positive attitudes toward the task were nurtured. The conferences also served as a time for our team to develop a working relationship and friendships.

Conclusions

Mrs. Spicher and Mrs. DiCello spent two days during the summer of 1989 organizing the nearly $4,000 in science supplies and equipment in a special storage room in the primary wing of Penns Manor Elementary School. During the 1989-90 year they have modeled an enthusiasm for and commitment to the teaching of science among their peers.

Dr. Beisel will continue to act as a resource person, teaching sample lessons as requested, providing encouragement and follow-up science inservice. Mr. Meshanko is taking an educational sabatical during the 1989-90 school year. He has been replaced by Mr. David Cowles, a research project participant. I have spoken to Mr. Cowles about the importance of the leadership role in facilitating and encouraging science teaching.

Recommendations

1. That support for participation of teachers at local, state, and regional
conferences be a priority for staff development.

2. That follow-up inservice on methods of teaching and managing science experiences for children be provided.

3. That building and district administration advocate, enable, and expect the teaching of activity-oriented science.

4. That the working relationship between Penns Manor and IUP be continued.

5. That follow-up research be conducted at the conclusion of one full year of curriculum implementation, in May 1990. Results of research on student and teacher attitudes will give a truer picture of the effectiveness of the project following full implementation.

Funding Sources

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MISSION

The Center for Rural Pennsylvania is a legislative agency of the Pennsylvania General Assembly that provides a focal point for rural policy development.

ACTIVITIES

A series of public hearings were conducted to:

Allow a broad spectrum of individuals to participate in the development of a rural policy agenda.

Encourage broader awareness of key rural issues.

Five subcommittees are established to:

Prioritize problems facing rural Pennsylvania.

Develop specific recommendations to address critical problems.

Information is provided to the Pennsylvania General Assembly through:

Rural Issue Papers and other technical papers.

Access to a rural data base.

A grants program is administered to:

Support research on matters related to policy development.

PENNSYLVANIA ACADEMY for the PROFESSION of TEACHING

OVERVIEW

The Pennsylvania Academy for the Profession of Teaching, an initiative of the State System of Higher Education, seeks "to improve teaching and learning at all levels of education and to enhance teaching as a profession." The Academy is unique insofar as all its activities are collaborative in the fullest sense . . . between and among faculty in the arts and sciences and in teacher education . . . public and independent colleges and universities . . . and the basic and higher education communities.

1989-90 Projects

Urban Education: Continues the Urban Education Project initiated in spring 1988 with emphasis on implementation of what was learned. Promotes continuing university-urban partnerships in Erie, Farrell, Johnstown, Lancaster, New Castle, and York. Supports the planning and implementation of centers for pre-service and in-service professional development in Philadelphia, Pittsburgh, Harrisburg, and the Lehigh Valley and provides the opportunity for teachers' aides in Philadelphia to become fully certified teachers.

Rural Education: Sponsors the exchange of faculty between higher and basic education, a Rural Educators Caucus, publication and dissemination of practices effective in rural schools, a study of the recruitment and retention of rural teachers, a planning group to develop a model induction project for beginning teachers, and the design of a school as the catalyst for community development.

Professionalization: Explores the fuller utilization of professional knowledge and skills of teachers and the restructuring of schools through participation in the Education Commission of the States (ECS) Re: Learning Project, and the development of a technologically advanced "Middle School of the Future" in the Steel Valley School District, Munhall.

Reform of Teacher Education: Supports the improvement of undergraduate teaching by sponsoring a statewide Summer Academy for the Advancement of Teaching and by providing grants for faculty to attend national conferences that focus on improving teaching skills. Sponsors a research study of different approaches to the graduate education of teachers.

Governor's School of Teaching: Provides a planning grant to develop a proposal for a Governor's School to be submitted to the Pennsylvania Department of Education. The School promotes teaching as a profession for high school students, particularly minorities, where the most critical shortage of teachers exist.

Latino Education Project: Supports model collaborative projects between universities and school districts with significant Latino enrollments by helping teachers on all levels to become more sensitive and more effective in meeting the needs of Latino youths.

School-Based Child Care Project: Sponsors a series of "Academy Child Care Institutes" for teams of parents, teachers, Head Start staff, and private day care providers. These institutes will become creative and innovative centers for the thoughtful consideration of the needs for child care in a community and the special needs of personnel preparations, as well as contribute to the development of a strong base for the delivery of comprehensive child care in Pennsylvania.

National Urban Conference: Plans a national conference, titled "Urban Schools: Putting the Myths to Rest," in Philadelphia, June 27-29, 1990, which will focus on the particular challenges of teaching in urban schools.

National Conference on Literacy: Supports a three-day conference, scheduled for April 2-4, 1990, that is sponsored by the National Governors' Association. The conference will focus on establishing partnerships between government agencies, the business community, and education to develop platforms for each state on literacy issues.

Subject Area Grants: Encourages the development of projects that enhance the content offerings in basic and higher education through collaborative planning and implementation. These projects will increase the articulation between basic and higher education as faculty members enhance traditional subject areas or forge new connections among and between these subject areas.

Research into Practice Grants: Supports applied research projects which may result in publication or serve as the basis for a statewide or regional seminar or conference. Proposals for the study of five-year or fifth-year teacher preparation programs, developmental education, service learning, and educational warranties are specifically requested.

Discretionary Grants: Funds a variety of special projects that are collaborative responses between higher education and basic education, focus on teachers and teaching, and have the potential for continuation and impact beyond the project itself. One such project is titled "Introduction to a Multicultural Community: Life Amid Diversity."

Colloquium Series: Extending the Educational Reform Agenda: Supports a series of conversations with national leaders in areas of educational reform, focusing on issues related to the professionalization of teachers, new directions in university/school district collaboration, incentives for teachers, and a futures conference in which state and national leaders will build scenarios for change in schools and universities.

1989-90 Impact Statement

During this year, participation in Academy projects will include staff from:

- 70 different school districts
- All 29 intermediate units
- 30 Pennsylvania colleges and universities
- 30 statewide and national organizations interested in education

To serve as a catalyst for reform, the Academy is funding a variety of activities, including:

- $180,000 in direct project grants to colleges, universities, and school districts
- $97,000 in additional planning grants
- $215,000 for research, development, and dissemination projects
- $133,000 in fellowship and assistantship awards and in professional development opportunities for educators throughout the Commonwealth

The State System of Higher Education, through its Pennsylvania Academy for the Profession of Teaching, supports educational reform which continues to address the essential questions:

Who will teach?

How will they learn to teach?

Will conditions in the schools allow them to use their education to serve all children?

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